APPENDIX 10F

Chemical Engineering Design Criteria

APPENDIX 10F

Chemical Engineering Design Criteria

10F1 Introduction

This appendix summarizes the codes, standards, criteria and practices that will be generally used in the design and installation for chemical engineering systems for the Sun Valley Energy Project (SVEP). More specific project information will be developed prior to construction of the project to support detailed design, engineering, material procurement specification and construction specifications as required by the California Energy Commission (CEC).

10F2 Design Codes and Standards

The design and specification of all work will be in accordance with the laws and regulations of the federal government and the state of California. Industry codes and standards partially unique to chemical engineering design to be used in design and construction are summarized below:

- ANSI—American National Standards Institute
- ANSI B31.1—Power Piping Code
- ASME—American Society of Mechanical Engineers
- ASME—Performance Test Code 31, Ion Exchange Equipment
- ASTM—American Society for Testing and Materials
- ASTM D859-94—Referee Method B for Silica as SiO_2
- ASTM D888-96—Referee Method A for Dissolved Oxygen
- ASTM D513-96—Referee Method D for CO_2
- OSHA—Occupational Safety and Health Administration
- SSPC—Steel Structures Painting Council Standards
- SSPC SP3—Power Tool Cleaning
- SSPC SP7—Brush-Off Blast Cleaning
- SSPC SP1—Solvent Cleaning
- SSPC SP6—Commercial Blast Cleaning
- SSPC SP5—White Metal Blast Cleaning
- UL—Underwriters Laboratories
- AWWA—American Waterworks Association
- WWA 2540-95—Method C for TDS

Other recognized standards will be used as required to serve as design, fabrication, and construction guidelines when not in conflict with the above listed standards.

The codes and industry standards used for design, fabrication, and construction will be the codes and industry standards, including all addenda, in effect as stated in equipment and construction purchase or contract documents.

10F3 General Criteria

10F3.1 Design Water Quality

10F3.1.1 Circulating Water

Reclaimed water for CTG evaporative cooling, landscape irrigation, process system makeup, and cooling will be provided by the Eastern Municipal Water District. Water used for makeup in the circulating water system will be fed directly from the reclaimed water supply line into one 150,000-gallon chlorine contact tank followed by one 150,000-gallon aboveground reclaimed water storage tank. The chlorine contact tank will provide a minimum of 90 minutes contact time and the reclaimed water storage tank will provide approximately 1.5 hours of operational storage in the event there is a disruption in the supply. Potable water will be used as an emergency backup supply source and only in those cases in which reclaimed water is disrupted for more than 12 hours.

10F3.1.2 Service Water

Reclaimed water from the chlorine contact tank will be used to supply the project with all general service water requirements such as non-potable sanitary as well as process needs.

Section 7.2 describes the quality of the reclaimed water that will be supplied to the project.

10F3.1.3 Water Treatment

Water treatment will be provided onsite prior to use for water injection. Demineralized water will be used for NO_x injection water. The demineralized water will be produced by a reverse osmosis (RO) and Ion Exchange (IX) system. The demineralized water will be stored in a 150,000-gallon demineralized water storage tank.

Treated water will be the highest quality practical. Minimum quality requirements will be as follows.

- Total dissolved solids – 3mg/l
- Silica as SiO_2 – 0.1 mg/l
- Specific conductance at demineralizer effluent – 0.5 μS/cm
- pH – 6.5 to 7.5

10F3.1.4 Construction Water

Water for use during construction will be provided by the Eastern Municipal Water District.

10F3.1.5 Fire Protection Water

Water for fire protection will be provided by the Eastern Municipal Water District through their dedicated fire water distribution system.

10F3.2 Chemical Conditioning

10F3.2.1 Circulating Water System Chemical Conditioning

Circulating (or cooling) water system blowdown will consist of reclaimed makeup water and other recovered process wastewater sources that have been concentrated by

evaporative losses in the cooling tower, and residues of the chemicals added to the circulating water. These chemicals will control scaling and biological growth in the cooling tower and corrosion of the circulating water piping and condenser tubes. Cooling water treatment will require the addition of a pH control agent (acid), a mineral scale dispersant (i.e., polyacrylate polymer), corrosion inhibitors (phosphate based), and biocide (i.e., sodium hydroxide or equivalent).

10F3.3 Chemical Storage

10F3.3.1 Storage Capacity

Chemical storage tanks will, in general, be sized to store a minimum of 1.5 times the normal bulk shipment. The minimum acceptable volume of the SCR aqueous ammonia storage tank will provide at least 7 days storage.

10F3.3.2 Containment

Chemical storage tanks containing corrosive or hazardous fluids will be surrounded by curbing. Curbing and drain piping design will allow a full tank capacity spill without overflowing the curbing. For multiple tanks located within the same curbed area, the largest single tank will be used to size the curbing and drain piping.

10F3.3.3 Closed Drains

Waste piping for volatile liquids and wastes with offensive odors will use closed drains to control noxious fumes and vapors.

10F3.3.4 Coatings

Tanks, piping, and curbing for chemical storage applications will be provided with a protective coating system. The specific requirements for selection of an appropriate coating will be identified prior to equipment and construction contract procurements.

10F3.4 Wastewater Treatment

Non-reclaimable waste water (brine) will be discharged into a pipeline that will connect with a non-reclaimable waste water pipeline that is being constructed for the Inland Empire Energy Center. This pipeline will return the non-reclaimable waste water through the Temescal Valley Regional Interceptor and Santa Ana Regional Interceptor pipeline system to the Orange County Sanitation District wastewater treatment plant, which discharges to an ocean outfall The Sanitation District is currently processing a permit to accept the waste discharge, but has provided preliminary oral communication that it could and would accept the quantity and quality of wastewater as described in Section 7.4.